UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/069,668	04/29/98	AHN	K 303.466US1

021186   MMC1/0509
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EXAMINER
COLEMAN,W

ART UNIT	PAPER NUMBER
2823	

DATE MAILED:
05/09/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

	Application No.	Applicant(s)
Office Action Summary	09/069,668	AHN ET AL.
	Examiner	Art Unit
	W. David Coleman	2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>21 February 2001</u> .

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-30 and 32-39</u> is/are pending in the application.

     4a) Of the above claim(s) <u>29 and 30</u> is/are withdrawn from consideration.

5) ☒ Claim(s) <u>12-27 and 32</u> is/are allowed.

6) ☒ Claim(s) <u>1-3, 6-11,33 and 35-39</u> is/are rejected.

7) ☒ Claim(s) <u>4, 5 and 34</u> is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☐ All b) ☐ Some * c) ☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1.   The request filed on February 21, 2001 for a Continued Prosecution Application (CPA)

under 37 CFR 1.53(d) based on parent Application No. 14 is acceptable and a CPA has been

established. An action on the CPA follows.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

3.   Claims 1, 2, 3, 7, 8, 9, 10, 11, 28, 35, 36, 37, 38 and 39 are rejected under 35

U.S.C. 103(a) as being unpatentable over Tsai, U.S. Patent 5,235,204 in view of Wolf,

"Silicon Processing For The VLSI ERA", vol. 2 (Process Integration), Lattice Press, 1990,

pp. 116-117 & 126-127.

4.   Pertaining to claims, 1, 7, 8, 9, 10, 28, 35, 36, 37, 38 and 39, Tsai discloses a

semiconductor process substantially as claimed. See **FIG. 6**, where a method of making an

emitter contact for an emitter region of a bipolar transistor is disclosed. Tsai discloses a

polysilicon structure **60** over an emitter region position of a semiconductive substrate (not

numbered). However, the metal emitter contact is not cross-diffused for a portion of the

polysilicon structure to produce a metal emitter contact entirely above the surface of the

substrate at the emitter region position. Wolf teaches the use of a doped polysilicon

sacrificial barrier in the fabrication of contacts and interconnects (pp. 126). A thin layer of

doped polysilicon can be used to separate the Al and the single-crystal Si substrate (Fig. 3-

28). After the Al:Si alloy film as been patterned, the contact structure is annealed (pp.127).

In view of Wolf, it would have been obvious to one of ordinary skill in the art to cross-

diffused a portion of the polysilicon into the metal emitter contact of Tsai because this

process alleviates the problem of junction spiking (pp. 116).

5.   Pertaining to claim 2, Tsai discloses an emitter region **40** as seen in **FIG. 6**. However,

in the absence of new or unexpected results, the mere reversal of the order of performing

process steps has been held to be prima facie obvious. In re Burhans, 154 F.2d 690, 69

USPQ 330 (CCPA

1946).

6.   Pertaining to claim 3, Tsai discloses that the emitter region 40 is polysilicon and

metallurgy level being aluminum which is obviously a doped layer (p-type) that will outdiffuse

into the polysilicon region when annealed.

7.   Pertaining to claim 11, Tsai discloses that the metal layer 64, can be aluminum.

8.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, U.S. Patent

5,235,204 in view of Wolf, "Silicon Processing For The VLSI ERA", vol. 2 (Process

Integration), Lattice Press, 1990, pp. 116-117 & 126-127, as applied to claims 1-3 and 7-11

above, and further in view of Aboelfotoh et l., U.S. Patent 5,801,444.

9.   The combined teachings of Tsai in view of Wolf discloses a semiconductor process

substantially as claimed as discussed above. However the combined teachings fail to

disclose a polysilicon layer that includes polysilicon and germanium. Aboelfotoh discloses a

semiconductor process wherein germanium is included with silicon for the purpose of

making electrical contacts. See FIG. 11, where germanium (11) is deposited with polysilicon

for the purposes of a contact for a semiconductor device. In view of Aboelfotoh it would

have been obvious to one of ordinary skill in the art to include germanium with polysilicon

for contact formation because a substantial advantage to be gained is that electrically stable

contact metallization (column 5, lines 49-51).

10.   Claims 4, 5 and 34 are objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

11.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure. Takakura et al., JP 5-62925; IBM-TDB No. NN85091442; Neudeck et al., U.S.

Patent 5,118,634 and Watanabe, U.S. Patent 4,987,562.

Allowable Subject Matter

12.   Claims 12-27 and 32 allowed.

13.   The following is an examiner's statement of reasons for allowance: prior art does not

teach a method of forming a polysilicon structure on an emitter region position of the

transistor, the polysilicon structure including a doped diffusion barrier layer on the emitter

region position and a polysilicon layer on the diffusion barrier layer; depositing metal

including at least one of aluminum, gold, and silver on the polysilicon layer; and heating at

least the deposited metal and the polysilicon structure to urge diffusion of the deposited metal

into the polysilicon layer, with the doped diffusion barrier layer inhibiting diffusion of the deposited metal into the emitter region of the transistor.

14.   Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

15.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

WDC
May 5, 2001